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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,734	08/19/2003	Itaru Shibata	040302-0337	3784
22428	7590	03/27/2006	EXAMINER	
FOLEY AND LARDNER LLP SUITE 500 3000 K STREET NW WASHINGTON, DC 20007			KALAFUT, STEPHEN J	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 03/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/642,734

Applicant(s)

SHIBATA ET AL.

Examiner

Stephen J. Kalafut

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 19 August 2003.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

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Claim 17 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The step of “physical vapor deposition” for depositing layers of electrode or electrolyte would be outside the scope of the term “laminating” in parent claim 15, which is how the “battery element” containing the electrode and electrolyte is deposited.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Seike *et al.* (US 5,308,712).

Seike *et al.* disclose a solid oxide fuel cell comprising an air electrode (5) having two layers (1, 2), an electrolyte (3) and a fuel electrode (4). The first layer (1) of the air electrode has a greater porosity than the second, and would thus correspond to the present “substrate”. The second layer (2), electrolyte (3) and fuel electrode (4) would constitute the present “battery element”. The second layer (2) has a lower porosity than the first, and pore sizes ranging from 0.2 to 3 microns (column 4, lines 17-20), thus corresponding to the present “low porosity layer”, and functioning as an electrode. The electrolyte is made of solid oxide, as indicated by the abbreviation “SOFC” (column 3, lines 58-68). The two layers are made of the same materials

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(column 4, lines 22-26). Thus, the low porosity layer, the substrate, and the electrode all have the same materials. Because of the porosity, gas would be permeable into the substrate.

Recitations of how the components were made are treated under product-by-process practice, and are thus not given patentable weight. See MPEP 2113 and the cases cited therein.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 9-11 and 13-16 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kim *et al.* (US 6,228,521).

Kim *et al.* disclose a solid oxide fuel cell (10) comprising a fuel electrode having two layers (13, 14), an electrolyte (12) and an air electrode (11). The first layer (14) of the fuel electrode has a greater porosity than the second, and would correspond to the present “substrate” (column 5, lines 20-22). The second layer would thus correspond to the present “low porosity layer”. The second layer (13), electrolyte (12) and air electrode (11) would constitute the present “battery element”. The second layer has a thickness as low as 5 microns and porosity as low as 10% (column 3, lines 47-54). Both layers are made of a composite of NiO and YSZ (column 4, line 59 through column 5, line 11), the latter also being a solid oxide electrolyte material. Thus, the low porosity layer, the substrate, and the electrode all have the same materials. Because of the porosity, gas would be permeable into the substrate. Recitations of how the components

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were made are treated under product-by-process practice, and are thus not given patentable weight. See MPEP 2113 and the cases cited therein. The materials of the battery element are slurry coated, and thus laminated, to the substrate (column 6, line 54 through column 7, line 21). Kim *et al.* do not explicitly state that any of the pores of the lower porosity layer (13) are 10 microns or less in diameter. However, with this layer having a thickness of as small as 5 microns (column 3, lines 52-54), the pores would have to be no larger. At best, it would be within the skill of the artisan to determine an optimal pore size given the overall size of the layer, and the effect of pore size on gas penetration and electrical conductivity. Likewise regarding claim 10, the Ra would have to be less than 5 microns for a layer to have that very thickness. At best, the artisan would be able to determine an optimal Ra for a given layer size. For these reasons, these claims would either be anticipated by or at best obvious over Kim *et al.*

Claims 7, 8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim *et al.*, above.

Kim *et al.* do not explicitly teach that the lower porosity layer itself can be made of two sub-layers of different porosities, or may have a porosity that decreases toward the battery element. However, Kim *et al.* teach that near the interface of the anode and the electrolyte, it is desirable to have more electrolyte material in the anode, and less electrolyte material and more porosity farther away from this interface (column 5, lines 1-11). While only two layers, each with a single porosity, are specifically disclosed, the general teaching of more porosity with more distance from the anode/electrolyte interface may be achieved in other ways, such as gradually

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increasing porosity, or more than two layers. For these reasons, these claims would be obvious over Kim *et al.*

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim *et al.* in view of Hata *et al.* (US 6,344,426).

Kim *et al.* do not disclose physical vapor deposition as a way to deposit an electrolyte layer or an electrode layer. Hata *et al.* teach physical vapor deposition as a method of depositing electrolyte material onto a porous ceramic material (column 9, lines 15-21). Because the anode of Kim *et al.* is porous and ceramic, it would be obvious to deposit the electrolyte of Kim *et al.* onto their anode using physical vapor deposition as taught by Hata *et al.*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shibata *et al.* (US 2002/0164523), Tsukuda *et al.* (US 6,479,183) and Pham *et al.* (US 6,803,141) disclose solid oxide fuel cells and materials for their electrodes.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sjk

  
STEPHEN MALACHUK  
PRIMARY EXAMINER  
GROUP 1700